The Food Island

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Abstract: The Food Island is a concept inspired by the five principles enunciated in the 4th SCAR Foresight Exercise of the EC - Directorate-General for Research & Innovation, namely: 1-food first, 2-sustainable yields, 3-cascading approach, 4-circularity, 5-diversity. It is also a vision to cope in a not-too-distant future with a daunting combination of threats: the increase of population, the social divide, the depletion of primary resources, soil degradation, species loss, climate change. The Food Island aims to realize the full potential of biological systems and develop the paradigm of bioeconomy in Europe through the production of human foods, animal feeds and biomaterials without using soil, freshwater, synthetic pesticides and fertilizers, at higher protein yields than soy and higher biomass yields than corn, providing a diversity of products not found in any other man-managed ecosystem.

The Food Island comprises 7 sections:
1st SECTION: Coastal integrated multitrophic aquaculture (IMTA), where molluscs and other invertebrates are grown and their wastes are used as nutrients for seaweed cultivation. Seaweeds also take up nutrients from deep or eutrophic waters (extractive aquaculture).
2nd SECTION: Seaweed biomass is anaerobically digested to biogas, which powers a gas engine and an electric generator. The outcome is electric energy, digestate and CO_2.
3rd SECTION: a greenhouse, cooled by evaporating seawater, where vegetables are grown. The greenhouse produces its own freshwater needs. Biofertilizers are obtained from digestate and seawater and also supplied by section 4.
4th SECTION: N_2-fixing marine cyanobacteria are grown in GWP® photobioreactors deployed on a rotating platform. The extracted biomass is used for biofertilizers and biostimulants. The CO_2-rich air stream exiting the reactors is used in the greenhouse and then re-captured.
5th SECTION: Microalgae are grown in semi-submerged tubular reactors using CO_2 from air capture. The section produces nutraceuticals, functional foods, and fish-feed.
6th SECTION: A second IMTA where fish and high-value seaweeds for functional foods and biomaterials are produced.

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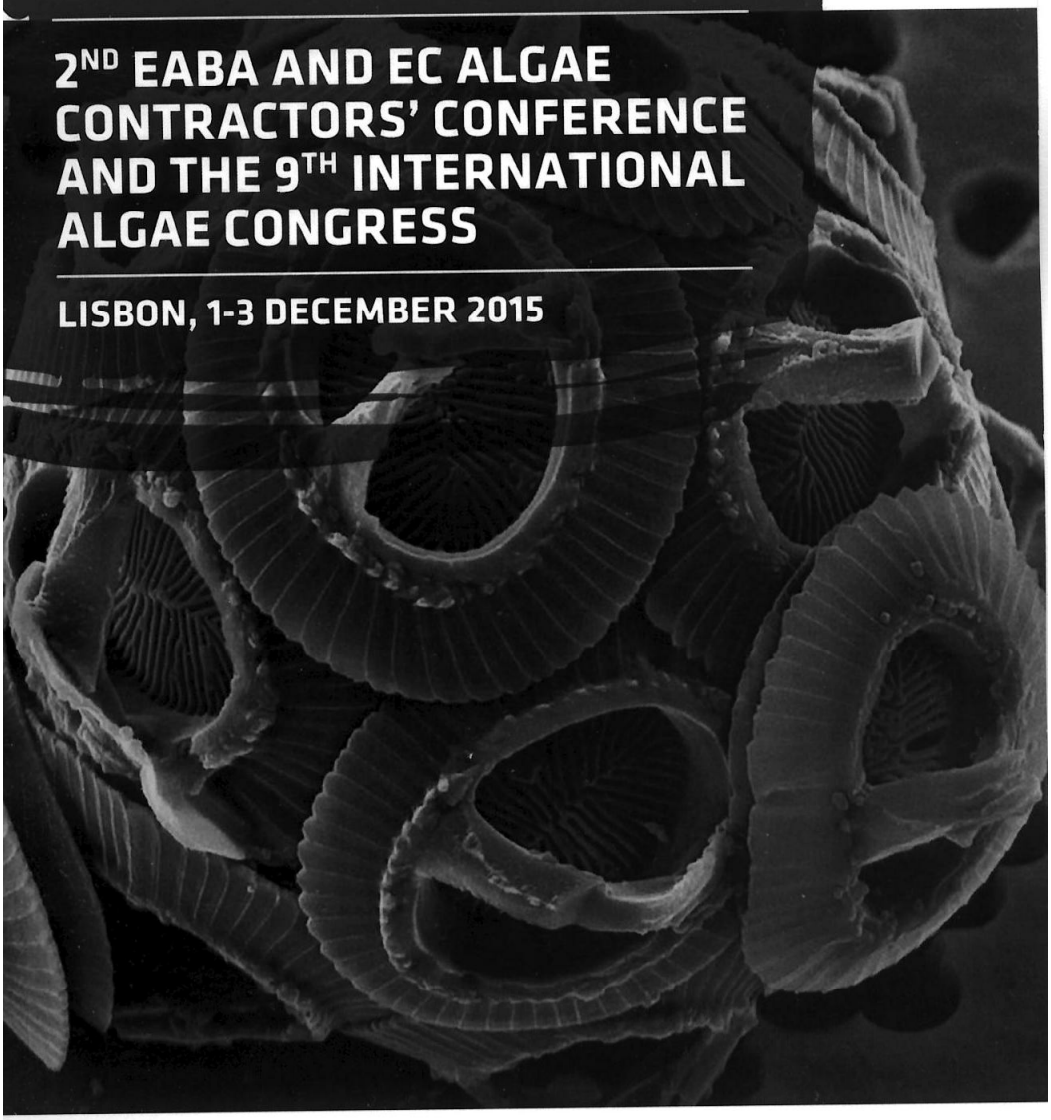

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